

will be reintroduced back into the front of the process after having its pressure and temperature restored to the original input reaction requirements.--

IN THE CLAIMS:

Please cancel claims 1-15.

Please add the following new claims:

16. A process for producing alkyl esters useful in biofuels and lubricants, said process

comprising:

providing an organic composition comprising one or more components

selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

providing a critical fluid medium including one or more fluids selected from the

group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and

mixtures thereof;

dissolving the organic composition and either a C₁-C₄ short chain alcohol or

water into the critical fluid medium; and

reacting the organic composition with the short chain alcohol or water in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein said glycerol leaves the single phase as it is formed;

wherein the particular critical fluid medium is selected so that, when combined with the organic composition, the critical fluid medium provides decreased loss of catalyst or catalytic activity and elimination of mass transfer limitations by maintaining the various reactants in a single phase.

3 17. The process of claim 16, wherein said short chain alcohol is selected from the group consisting of ethanol, methanol, propanol, butanol, isopropanol and isobutanol.

4 18. The process of claim 16, wherein said catalyst is a liquid phase catalyst.

4.7 19. The process of claim 18, wherein said liquid phase catalyst is selected from the group consisting of HCl, H₂SO₄, HNO₃, NaOH, and KOH.

acid base

p. 7 5 20. The process of claim 16, wherein said catalyst is a solid phase catalyst.

Bl 21. The process of claim 20, wherein said solid phase catalyst is a microporous crystalline solid.

10 22. The process of claim 20, wherein said solid phase catalyst is an exchange resin with either acidic or basic properties.

9 23. The process of claim 20, wherein said solid phase catalyst is an inorganic oxide selected from the group consisting of alumina, silica, silica-alumina, boria, oxides of phosphorus, titanium dioxide, zirconium dioxide, chromia, zinc oxide, magnesia, ion exchange resins, silicate catalysts, and calcium oxide either unmodified or modified with chlorine, fluorine, sulfur or an acid or base.

11 24. The process of claim 16, wherein said process further comprises:

separating the glycerol from said final product; and

separating the alkyl ester from said critical fluid.

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12 25. The process of claim 16, further comprising recycling said critical fluid medium for use in a later reaction. P. 81 1/2 226

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26. A process of claim 16, wherein said C₁-C₄ short chain alcohol is dissolved into the critical fluid medium.

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112 27. The process of claim 16, wherein said critical fluid medium optionally includes a critical fluid co-solvent selected from the group consisting of methanol, ethanol, butanol, and water.

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28. A process for producing alkyl esters useful in biofuels and lubricants, said process comprising:

providing an organic composition comprising one or more components

selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

providing a critical fluid medium including one or more fluids selected from the

group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and

mixtures thereof, and optionally including one or more critical fluid co-solvents selected from the group consisting of methanol, ethanol, butanol, and water;

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dissolving the organic composition and either a C₁-C₄ short chain alcohol or water into the critical fluid medium; ^{CO₂ or propane}

reacting the organic composition with the short chain alcohol or water in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein said glycerol leaves the single phase as it is formed;

separating said glycerol from said final product by modifying the temperature and pressure of the final product; and ^{ROH, AOH, etc.} ^{NO P optimal solvent}

separating said alkyl ester product from said critical fluid by modifying the temperature and pressure of the critical fluid medium.

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29. A process for producing alkyl esters useful in biofuels and lubricants, said process comprising:

providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

providing a critical fluid medium including one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and mixtures thereof;

dissolving the organic composition and either a C₁-C₄ short chain alcohol or water into the critical fluid medium; and

reacting the organic composition with the short chain alcohol or water in the presence of a catalyst at a temperature from about 20°C to about 200°C and a pressure from about 150 psig to about 4000 psig, wherein the reaction occurs in a single phase